Before the
FEDERAL COMMUNICATIONS COMMISSION
Washing, D.C. 20554

In the Matter of	)	
	)	
Use of Spectrum Bands Above 24 GHz for Mobile Radio Services	)	GN Docket No. 14-177
	)	
Establishing a More Flexible Framework to Facilitate Satellite Operations in the 27.5-28.35 GHz and 37.5-40 GHz Bands	)	IB Docket No. 15-256
	)	
Petition for Rulemaking of the Fixed Wireless Communications Coalition to Create Service Rules for the 42-43.5 GHz Band	)	RM-11664
	)	
Amendment of Parts 1, 22, 24, 27, 74, 80, 90, 95, and 101 To Establish Uniform License Renewal, Discontinuance of Operation, and Geographic Partitioning and Spectrum Disaggregation Rules and Policies for Certain Wireless Radio Services	)	WT Docket No. 10-112
	)	
Allocation and Designation of Spectrum for Fixed-Satellite Services in the 37.5-38.5 GHz, 40.5-41.5 GHz and 48.2-50.2 GHz Frequency Bands; Allocation of Spectrum to Upgrade Fixed and Mobile Allocations in the 40.5-42.5 GHz Frequency Band; Allocation of Spectrum in the 46.9-47.0 GHz Frequency Band for Wireless Services; and Allocation of Spectrum in the 37.0-38.0 GHz and 40.0-40.5 GHz for Government Operations	)	IB Docket No. 97-95

OPPOSITION OF CTIA

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I. INTRODUCTION AND SUMMARY.

CTIA[1] respectfully submits this Opposition to Petitions for Reconsiderations in the above-captioned proceedings.[2] CTIA commends the Commission for moving rapidly to realize

[1] CTIA – The Wireless Association® ("CTIA") (www.ctia.org) represents the U.S. wireless communications industry and the companies throughout the mobile ecosystem that enable Americans to lead a 21st century connected life. The association's members include wireless carriers, device manufacturers, suppliers as well as apps and content companies. CTIA vigorously advocates at all levels of government for policies that foster continued wireless innovation and investment. The association also coordinates the industry's voluntary best practices, hosts educational events that promote the wireless industry and co-produces the industry's leading wireless tradeshow. CTIA was founded in 1984 and is based in Washington, D.C.

[2] *Use of Spectrum Bands Above 24 GHz for Mobile Radio Services*, Report and Order and Further Notice of Proposed Rulemaking, 31 FCC Rcd 8014 (2016) ("*Spectrum Frontiers*

the ambitious, but important, goal of opening up high-band spectrum for next-generation wireless broadband. As the Commission has recognized, "[t]he next generation of wireless connectivity—the fifth generation, or 5G—is essential to seizing the 21st century opportunities in wireless broadband technologies."[3] To help achieve this goal, and after thorough consideration of the views of all stakeholders, the Commission developed a framework in the *Spectrum Frontiers Order* that allows flexible and rapid deployment of 5G for mobile terrestrial use while also permitting use of high-band spectrum for satellite services.

Some satellite providers, however, have presented reconsideration requests that would disturb this balance and undermine the Commission's goal of enabling the rollout of 5G. CTIA therefore urges the Commission to reject satellite filers' petitions that seek to:

- Overturn the limits on additional earth stations in the terrestrial mobile spectrum bands that were designed to balance terrestrial and satellite use of spectrum above 24 GHz;[4]
- Require unnecessary limits on terrestrial operations in the 28 GHz band to protect against aggregate interference;[5]

Order").

[3] *Fact Sheet: Spectrum Frontiers Rules Identify, Open Up Vast Amounts of new High-Band Spectrum for Next generation (5G) Wireless Broadband*, FCC (June 23, 2016), https://apps.fcc.gov/edocs_public/attachmatch/DOC-339990A1.pdf.

[4] SES Americom and O3B Limited Petition for Reconsideration, GN Docket No. 14-177, at 4 (Dec. 14, 2016) ("SES & O3B Petition for Reconsideration"); Satellite Industry Association Petition for Reconsideration, GN Docket No. 14-177, at 5-7 (Dec. 14, 2016) ("SIA Petition for Reconsideration"); Boeing Petition for Reconsideration, GN Docket No. 14-177, at 23 (Dec. 14, 2016) ("Boeing Petition for Reconsideration"); EchoStar Satellite Operating Corporation, Hughes Network Systems, LLC, and Inmarsat, Inc. Joint Petition for Reconsideration, GN Docket No. 14-177, at 15-21 (Dec. 14, 2016) ("EchoStar, Hughes, and Inmarsat Joint Petition for Reconsideration").

[5] SIA Petition for Reconsideration at 11-12; SES & O3B Petition for Reconsideration at 19-24.

- Reargue the already refuted assertion that satellite systems have primary status in the 28 GHz band;[6]

- Extend significant additional technical limitations on terrestrial mobile providers that would thwart innovation and contradict the Commission's stated goals in this proceeding;[7] and

- Obtain satellite access to the 42-42.5 GHz band, creating a windfall of spectrum for satellite operations in high-band spectrum.[8]

In short, the satellite petitioners are seeking to dismantle many of the key actions taken by the Commission in the *Spectrum Frontiers Order*. If accepted, these changes would not only undermine the framework established for terrestrial mobile broadband and satellite use of the spectrum above 24 GHz, but would endanger U.S. leadership in 5G. CTIA therefore urges the Commission to reject the satellite petitioners' proposals, as discussed herein, and instead reaffirm the sensible and supportable decisions it made in the *Spectrum Frontiers Order*.

II. THE EARTH STATION LICENSING LIMITS ADOPTED IN THE *SPECTRUM FRONTIERS ORDER* ARE CONSISTENT WITH PAST PRECEDENT AND WERE FULLY VETTED THROUGH THE RULEMAKING PROCESS.

In the *Spectrum Frontiers Order*, the Commission adopted a number of licensing requirements that were supported by the record and consistent with rules adopted in past rulemaking proceedings. For instance, the Commission limited the interference zone around earth stations to "cover no more than 0.1 percent of the population of the county license area where the earth station is located" and required that the interference zone "not infringe upon any major event venue, arterial street, interstate or U.S. highway, urban mass transit route, passenger

[6] SIA Petition for Reconsideration at 7-11.

[7] Boeing Petition for Reconsideration at 6-18.

[8] *Id*. at 21; ViaSat, Inc. Petition for Reconsideration, GN Docket No. 14-177, at 5-7 (Dec. 14, 2016) ("ViaSat Petition for Reconsideration").

railroad, or cruise ship port" (*i.e.*, transient population areas).[9] The Commission also decided that it "will not adopt a limit on aggregate skyward interference from 28 GHz band [Upper Microwave Flexible Use Service ("UMFUS")] stations or require that UMFUS stations employ specific techniques to reduce skyward emissions."[10]

The satellite proponents, however, seek to undermine these well-reasoned licensing obligations. Specifically, SES and O3b argue that the Commission should modify the 0.1 percent limit and remove the limits on satellite earth stations in transient population areas.[11] EchoStar, Hughes Network, and Inmarsat similarly argue for the removal of limits on satellite earth stations in transient population areas while also arguing for the Commission to replace the 0.1 percent limit with the coordination regime proposed by AT&T and EchoStar.[12] Meanwhile, Boeing argues that the Commission should apply the 0.1 percent limit at the U.S. population level rather than at the county or Partial Economic Area ("PEA") level.[13] Finally, SES and O3b also ask the Commission to make UMFUS authorizations subject to the resolution of the technical and regulatory issues implicated by aggregate interference into Fixed Satellite Service ("FSS") satellites.[14] None of the above arguments is availing, as the Commission already considered and dismissed these arguments. Therefore, as discussed in detail below, the Commission should reject these requests and reaffirm the careful

[9] *Spectrum Frontiers Order* ¶ 54.

[10] *Id*. ¶ 294.

[11] SES & O3B Petition for Reconsideration at 5, 14.

[12] EchoStar, Hughes, and Inmarsat Joint Petition for Reconsideration at 11, 15.

[13] Boeing Petition for Reconsideration at 6-18.

[14] SES & O3B Petition for Reconsideration at 23.

licensing regime adopted in the *Spectrum Frontiers Order*.

A. The Earth Station Limits Adopted By The Commission Are Sound And Provide FSS Flexibility Without Inhibiting Terrestrial Broadband Services.

During the pendency of the rulemaking process, satellite proponents asserted that the 0.1 percent limit would discourage deployment in less densely populated areas, would unnecessarily restrict the growth of satellite services, and should therefore be rejected.[15] In its reconsideration request, Boeing again asserts that "the impact will be to force satellite system operators to locate earth stations in more populated PEAs,"[16] and SES/O3b reiterates that the limits on earth stations would "unreasonably constrain the number of suitable siting locations for GSO and NGSO earth stations."[17] The Commission responded to these same arguments during the underlying rulemaking proceeding, noting that "FSS operators will have great flexibility in selecting earth stations that meet their needs"[18] and that "FSS operators will have other mechanisms available to deploy earth stations that do not have to protect terrestrial services."[19] For example, FSS operators could enter into private agreements with terrestrial licensees or they could deploy without an interference protection zone.[20] Additionally, while appreciative of the joint EchoStar/AT&T compromise proposal, the Commission found that it would provide less

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[15] *See e.g.*, *Ex Parte* Presentation of Inmarsat Inc., GN Docket No. 14-177, at 4-5 (filed July 7, 2016); *Ex Parte* Presentation of SES Americom, Inc., GN Docket No. 14-177, at 1 (filed July 7, 2016); *Ex Parte* Presentation of O3b Limited, GN Docket No. 14-177, at 2 (filed July 7, 2016).

[16] Boeing Petition for Reconsideration at 23.

[17] SES & O3B Petition for Reconsideration at 5.

[18] *Spectrum Frontiers Order* ¶ 55.

[19] *Id*. ¶ 58.

[20] *Id*.

predictability regarding FSS earth station locations and limited the ability of FSS to deploy near population centers.[21] In sum, the satellite petitioners have not provided any new basis or rationale to overturn the Commission's reasoned decision-making governing the authorization of new FSS earth stations. The Commission should therefore reject their requests for reconsideration.[22]

B. The Commission Properly Rejected Aggregate Interference Concerns In The Underling Rulemaking Proceeding.

The arguments raised by SES, O3b, and SIA regarding aggregate interference are similarly duplicative and ignore the factual record. In their petition, SES and O3b ask the Commission to reconsider its findings regarding aggregate interference, arguing that the Commission based its determination on speculative use cases for terrestrial 5G systems.[23] However, the Commission already fully vetted and dismissed these arguments. In the underlying rulemaking, the Commission considered prior satellite and terrestrial proponent comments on aggregate interference and found that the analyses provided by satellite operators to support their claims were based on overly conservative assumptions and depicted a worst-case scenario.[24] Thus, rather than base its determination on "the most sensitive projections about future, planned satellite network deployments,"[25] the Commission relied upon current satellite system

[21] *Id*. ¶ 60.

[22] *See* 47 C.F.R. §§1.429(l), 1.429(l)(3) ("Petitions for Reconsideration that . . . do not warrant consideration by the Commission" include petitions that "[r]ely on arguments that have been fully considered and rejected by the Commission within the same proceeding").

[23] SES & O3B Petition for Reconsideration at 20-21.

[24] *Spectrum Frontiers Order* ¶ 295.

[25] *Id*.

configurations for much of its analysis. In so doing, it found that it did "not believe the record demonstrate[d] that there is a risk of interference to satellite from aggregate interference caused by UMFUS stations."[26] The Commission thus already determined that the threat from aggregate interference was overstated and devised its rules accordingly; it need not now reconsider that refuted argument here.[27]

In addition, SIA argues that the Commission's decision to not place a limit on skyward emissions of mobile broadband systems would violate International treaty obligations.[28] SIA bases this argument on its view that RR No. 21.5 of the ITU Radio Regulations limits maximum transmit power to 10 dBW (40 dBm) per station in the fixed or mobile services.[29] This argument is flawed and ignores the fact that the Commission adopted an Equivalent Isotropically Radiated Power ("EIRP") limit that includes antenna gain as part of the requirement. In making its argument, SIA selectively reviewed the ITU Radio Regulations. In addition to RR No. 21.5, ITU also promulgated RR No. 21.3, which limits the EIRP for fixed and mobile stations to 55 dBW (85 dBm).[30] The Commission has generally adopted limits on EIRP rather than on transmit power to fully consider the interference effects of the system, including any antenna gain.[31] In this instance, the Commission, as is its custom for fixed and mobile transmit requirements, adopted an EIRP limit for UMFUS base stations. This limit is 75 dBm/100 MHz EIRP, or more

[26] *Id*. ¶ 294.

[27] *See* 47 C.F.R. §1.429(l)(3).

[28] SIA Petition for Reconsideration at 12-13.

[29] *Id*.

[30] ITU Radio Regulation No. 21.3.

[31] *See e.g.*, 47 C.F.R. §§ 22.913, 24.232, 27.50.

than 10 dB more stringent than the ITU requirements. Therefore, contrary to SIA's assertions, the Commission's base transmit limits are not only consistent with the more relevant EIRP requirements for the bands above 24 GHz, they are, in fact, more rigorous than ITU requirements.

C. The Commission Should Not Readjust FSS Allocation Rights.

Similarly, SIA's arguments that the Commission should grant FSS providers co-primary status in the 28 GHz band is repetitive and remains unavailing. As the Commission noted in the *Spectrum Frontiers Order*, "[s]atellite operators deployed in this band knowing that they were secondary licensees with respect to [the Local Multipoint Distribution Service], that the Commission had chosen to allow only limited satellite use, and that the Commission had long envisioned allowing mobile use in the band."[32] Thus, as the Commission stated, satellite providers had no expectation of co-primary status in the 28 GHz band, and "upgrading the FSS designation to co-primary status, even if limited to individually licensed earth stations, would be inconsistent with terrestrial use of this band and the Commission's decision to facilitate expanded terrestrial use, and would not effectively facilitate sharing in the band."[33] Since they had no expectation of co-primary status, satellite providers have suffered no harm.

In sum, the FSS petitioners seek to reargue the same issues raised and resolved during the proceeding. The Commission should reject these arguments as repetitive and counterproductive to U.S. leadership in the development and encouragement of next-generation terrestrial mobile services.[34]

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[32] *Spectrum Frontiers Order* ¶ 47.

[33] *Id*. ¶ 50.

[34] *See* 47 C.F.R. §1.429(l)(3).

III. LIMITS ON TERRESTRIAL USE OF THE SPECTRUM ABOVE 24 GHZ ARE INCONSISTENT WITH THE GOALS OF THE PROCEEDING.

Boeing seeks adoption of extensive limitations on the use of the spectrum above 24 GHz for terrestrial services, including:

- Limits on base station power for terrestrial mobile systems;[35]
- Mandated beamforming and power control requirements;[36]
- Bifurcated rules governing the UMFUS into Parts 30 and 101with fixed operations governed by Part 101;[37] and
- Prohibited use of omni-directional antennas by terrestrial mobile operations.[38]

At the outset, CTIA notes that Boeing's proposals, if adopted, would artificially limit the flexibility needed to provide mobile broadband services. Such an outcome would undermine the Commission's goal of "rapid advancement to next-generation 5G networks and technologies."[39] The Commission should therefore reject this argument as counterproductive to the agency's expressly stated purpose in this proceeding.

Substantively, Boeing fails to acknowledge the other data filed in the record that the Commission found compelling in reaching its decision on these issues. Samsung, for example, noted in the record of the underlying proceeding that "the power limits proposed for the millimeter wave bands are too restrictive for fixed base stations . . . increasing the power limits

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[35] Boeing Petition for Reconsideration at 7-10.

[36] *Id*. at 10-12.

[37] *Id*. at 18-20.

[38] *Id*. at 20-21.

[39] *Fact Sheet: Spectrum Frontiers Rules Identify, Open Up Vast Amounts of new High-Band Spectrum for Next generation (5G) Wireless Broadband*, FCC (June 23, 2016), https://apps.fcc.gov/edocs_public/attachmatch/DOC-339990A1.pdf.

for the millimeter wave bands will allow for more robust services to consumers and allow licensee flexibility to develop and deploy innovative new services."[40] Additionally, as Verizon noted, "[a]pplying the same maximum transmission power limit used for base stations in [Personal Communications Service] and [Advanced Wireless Service] spectrum to [millimeter wave] bands would restrict power levels too much because power would likely be spread over much wider bandwidths, resulting in much lower EIRP-per-MHz levels and correspondingly lower ranges."[41] Moreover, as Ericsson highlighted, "an unencumbered band of spectrum with uniformity of service and technical rules will facilitate the assignment of large contiguous blocks that are so important for 5G."[42] Boeing ignores each of these technical and policy points in making its claim and fails to address the analysis and simulation results provided by commenters.[43]

Additionally, Boeing argues that a total radiated power limit is required to limit the maximum directional power density of UMFUS base stations.[44] As noted in our response to the aggregate interference arguments raised by SIA *infra*, the Commission has consistently employed limits on EIRP rather than relying upon more complex limits as suggested by Boeing to mitigate transmit power interference effects. There is simply no need to adopt a more complex regulatory scheme as suggested by Boeing since EIRP already factors in antenna

[40] Samsung Comments, GN Docket No. 14-177, at 18-19 (Jan. 26, 2016).

[41] Verizon Comments, GN Docket No. 14-177, at 16 (Jan. 28, 2016).

[42] Ericsson Comments, GN Docket No. 14-177, at 12 (Jan. 26, 2016).

[43] Straight Path Reply Comments, GN Docket No. 14-177, at 26 (Feb. 26, 2016); Nokia Comments, GN Docket No. 14-177, at 26-27 (Jan. 27, 2016); Nokia Reply Comments, GN Docket No. 14-177, at 7 (Oct. 31, 2016).

[44] Boeing Petition for Reconsideration at 9.

characteristics and will, as determined by the Commission, adequately protect against harmful interference effects.

The Commission carefully reviewed the record in this proceeding. In so doing, it found that a base station power limit of 75 dBm/100 MHz EIRP was appropriate because it would be consistent with the power limits for other spectrum bands and because additional power would be needed to overcome the signal attenuation prevalent at the higher frequencies.[45] The Commission also found that the higher power limit adopted would not affect the limited gateway FSS operations permitted in the band.[46] Boeing presents no new information to compel the Commission to reconsider its decision, thus its request should be rejected.[47]

Similarly, the Commission should not consider Boeing's requests for mandatory beamforming and power control requirements, bifurcation of fixed and mobile uses, or prohibition of omni-directional antennas. Technical mandates as suggested by Boeing are antithetical to the regulatory flexibility consistently granted by the Commission to parties that purchased spectrum licenses in auctions over the past twenty years. Boeing presents no compelling evidence to support revisiting the highly successful regulatory model of allowing parties to innovate via technical standards without regulatory mandates. CTIA therefore asks the Commission to affirm its decision regarding base station transmit power limits and reject Boeing's proposed restrictions on the use of spectrum above 24 GHz.

[45] *Spectrum Frontiers Order* ¶ 277.

[46] *Id*. ¶ 278.

[47] *See* 47 C.F.R. §1.429(l)(3).

IV. THE 42-42.5 GHZ BAND SHOULD BE RESERVED FOR TERRESTRIAL MOBILE SERVICES.

ViaSat and Boeing seek reconsideration of the Commission's decision declining "to allocate the 42 GHz band for FSS downlink operations."[48] When the Commission sought comment on the use of this band, it did so for both fixed and mobile terrestrial services and for FSS.[49] After weighing the record, it determined that the public interest called for maintaining the existing allocations without change.[50] The Commission made this determination after considering the comments received on the issue in the record, including those filed by Boeing and SIA in support of use of the band for FSS.[51] The Commission acted reasonably in maintaining the existing allocations in the 42-42.5 GHz band. As noted in the *Spectrum Frontiers Order*, FSS has access to a significant amount of access to high band spectrum, leading the Commission to conclude there is "less reason to further expand FSS operations to the 42 GHz band."[52] On the other hand, the Commission correctly noted that "there is value in potentially having [a UMFUS] band available for exclusive terrestrial use,"[53] particularly given the disparate amount of spectrum available for licensed mobile uses as compared to FSS in the spectrum above 24 GHz. CTIA therefore supports the Commission's determination that there is no need

[48] *See* ViaSat Petition for Reconsideration at 6; Boeing Petition for Reconsideration at 21; *see also Spectrum Frontiers Order* ¶ 368.

[49] *Use of Spectrum Bands Above 24 GHz for Mobile Radio Services*, Notice of Proposed Rulemaking, 30 FCC Rcd 11878, ¶ 80 (2015) ("*Spectrum Frontiers NPRM*").

[50] *Spectrum Frontiers Order* ¶ 368.

[51] *See id*. ¶ 366; *see also* Reply Comments of SIA, GN Docket No. 14-177, at 14 (filed Feb. 26, 2016); Comments of The Boeing Company, GN Docket No. 14-177, at 9 (filed Jan. 28, 2016).

[52] [52] *Spectrum Frontiers Order* ¶ 368.

[53] *Id*.

for additional FSS downlink allocations in the 42-42.5 GHz band, and the Commission should not entertain contrary proposals by Boeing and ViaSat. Boeing and ViaSat have not demonstrated that the Commission failed to seek comment on this issue, nor could they given the questions raised by the Commission in the *Spectrum Frontiers NPRM*,[54] or that the Commission acted without regard to the record in reaching its decision. CTIA therefore urges the Commission to retain the allocation status of the 42-42.5 GHz band as decided in the *Spectrum Frontiers Order*.

[54] *See Spectrum Frontiers NPRM* ¶ 80 (seeking comment on "the relative merits of using [the 42-42.5 GHz] band for FSS, fixed, or mobile use, or the ability to share among these different uses" as well as "the extent to which different services could share in this band, and what sharing mechanisms, if any, would be appropriate"); *see also Spectrum Frontiers Order* ¶ 366.

V. CONCLUSION.

The Commission should reject the requests for reconsideration made by the satellite industry. Any action to revisit the well-considered decisions surrounding spectrum sharing, technical requirements, and spectrum allocation would undermine the certainty needed to maintain the U.S. leadership position in development of 5G services.

Respectfully submitted,

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